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two stages (transparent and opaque) which appear so strikingly in slowly-clotting mammalian blood. These stages are superficial phenomena which merely reflect the extent of fibrin-formation. Coagulation is a gradual continuous process of fibrin-formation; and in the clotting of normal plasma, fibrin needles can be demonstrated in the earliest appreciable coagulum, however delicate, transparent or gel-like.

ARNOLD RICE RICH

### THE KENTUCKY ACADEMY OF SCIENCE

THE seventh annual meeting of the Kentucky Academy of Science was held at the University of Kentucky, Lexington, on Saturday, May 8, President P. P. Boyd presiding. The secretary's report showed a membership of 110, and 24 new members were elected at this meeting. Resolutions were adopted accepting the terms of affiliation with the American Association for the Advancement of Science and establishing two classes of active members: national and local; and looking to cooperation with the American Ecological Society in preservation of natural conditions. The principal address, "The twentieth century's contribution to our knowledge of the atom" was delivered in the afternoon by Professor R. A. Millikan, who was afterwards elected an honorary member of the academy.

The following program of papers was rendered:

President's address. *The future of the Kentucky Academy*: DEAN PAUL P. BOYD, University of Kentucky. The speaker presented first the summaries of state academies given by Mr. D. D. Whitney in SCIENCE of December 5, 1919 and then told the results of a questionnaire which he had lately sent to secretaries of state academies, the object being to ascertain the future and the field of such organizations. He concluded that there is a definite need for them and urged that the Kentucky Academy begin a forward movement in order to fill more properly its field in the nation-wide organization of science. Some of his suggestions were that the academy cooperate more effectively with the national bodies; that membership be extended more widely to educational and industrial plants; that science clubs be organized throughout the state; that better science teaching in the high schools be promoted; that funds be solicited from the legislature and private sources for publication and research funds; that committees be formed

for the study of important state problems and for state surveys; and that recommendations be formulated for presentation to the next legislature.

*Blood lines of genetic value*: W. S. ANDERSON, Kentucky Experiment Station. In the domestic breeds of live stock great sires seldom produce more than one or two sons that are greater progenitors than themselves. This means, in blooded stock, that the greatness of any given blood line is handed on by one or two in any one generation, the others of the generation merely add members. In support of the statement, the great sires of nine breeds of domestic animals were cited and the few sons of each were named who have been instrumental in handing on the breeds.

*Failure of lettuce to head*: A. J. OLNEY, and W. D. VALLEAU, Kentucky Experiment Station. The various physiological troubles associated with the failure of greenhouse head lettuce, including those known as rosette, tip-burn, black heart and elongation of the central stalk with the production of laterals (Rio Grande disease), have been found to be associated with a root rot apparently due to *Fusarium*, sp. Soil sterilization by steam and formaldehyde have only partially controlled the trouble, due probably to incomplete sterilization of the lower soil layers.

*Variation in *Abutilon Theophrasti* Medici*: CHARLES A. SHULL, University of Kentucky. This paper is a report of progress in an investigation of variability in the number of carpels in the ovaries of *A. Theophrasti*. The range of variability is from ten to seventeen, with the mode usually on fourteen or fifteen. The material shows a skewed frequency distribution, and tendency toward half Galton-curves. A number of plants have been found with half curves and the mode on 15. But whenever a number of plants are counted together, there are usually a small number falling on sixteen. Only three specimens in about 8,000 had seventeen carpels to the ovary. The mode falls on a lower number in material collected in Kansas than in similar material from Kentucky. The drier climate of Kansas is probably responsible for this difference. If plants from an unfavorable habitat are counted the mode is found to be depressed. The modifications of the variability curves noted are probably related rather directly to nutritional conditions. Heredity and suboptimal nutrition are believed to be responsible for the half-curve variability.

*Some factors to be considered in attempting to communicate with supposed inhabitants of Mars*:

HENRY MEIER, Centre College. In the first place, the probable low temperature, rarified atmosphere and absence of water are against the existence on the planet of beings endowed similarly to us. Ability to signal by light is negated by the fact that the earth's atmosphere would absorb about 40 per cent. of the light sent out, and by the great distance. The author estimates that an area of light 10 miles square, on the earth, if seen from Mars through a telescope magnifying 500 times, would appear like an area 1 inch square, viewed at a distance of 500 feet. The possibility of signaling by radio is negated by the distance, it being computed that it would require a current of a million amperes at the sending station in order to obtain one of one ampere at a receiving station on Mars, when the planet is nearest the earth. Besides, the powerful currents radiated from the sun would probably overwhelm the weak waves from the earth.

*The future of nutrition and medicine:* DR. A. W. HOMBERGER, University of Louisville. The paper brought out the close relation between diets in health and disease. It laid emphasis upon the benefits derived from urine and blood analyses. Urine analysis is not new and yet, with the modern methods of blood analysis, it becomes a new and valuable aid in treating diseases. The direct relations were illustrated by the conditions found in the body under diabetic conditions. Tables showing analyses representing the work of some 80 men on blood and urine were presented—also a classified schedule of dietaries the object of each group being to throw together foods particularly adapted to the diseases involved. The author predicts that in the future there will be a closer scientific relation between the nutrition of the sick and medicine than there has been in the past.

*Asphalt coal:* W. R. JILLSON, state geologist. By title.

*Note on the occurrence of cretaceous sediment in the "between the rivers" section in Trigg and Lyon counties:* W. R. JILLSON, state geologist. By title.

*Some observations on the life-history of the praying mantis:* MISS MARY DIDLAKE, Kentucky Experiment Station. Two species, the common *Stagmomantis carolina* and a big Chinese one, *Tenodera sinensis*, were carried through several generations in as many successive years, reared in the laboratory, individuals being kept separate, at first in homeopathic vials, then in 4-ounce, wide-mouthed bottles and finally in 6-inch stender dishes.

Hatching, molting, regeneration of limbs and antennæ, mating, egg-laying, all were frequently observed and recorded. It was found possible to distinguish the sexes after the first molt and with certainty after the second. The native species required about 80 days to become adult, males commonly molting only 6 times and females usually 7 times. The Chinese species averaged 78 days to adult emergence and both sexes molted 7 times, a few individuals requiring 8 molts.

*Materia prima:* REV. E. L. VAN BECELAERE, Cardome. The medieval conception of the "Materia Prima" may appear thoroughly superseded by the discoveries of modern chemistry; however, such a conception, if properly understood, finds a confirmation in them rather than a disproof. The possession of a similar order of fundamental properties by each one of the elements recognized by modern chemistry, in spite of the differentiations peculiar to each of them, reveals one substratum common to all, although diversified in each one. That substratum is the "Materia Prima" accessible only to the mind, yet real and existing in each of the elements.

*Some interesting fungi of the Kentucky Mountains. The lichens of Cowbell Hollow:* G. D. SMITH, Eastern Kentucky State Normal School. Nearly 100 excellent lantern slides in natural colors, prepared by the author, were exhibited and explained, illustrating fungi and lichens observed.

*The value of memory systems:* J. J. TIGERT, University of Kentucky. An experiment is described with a class of 45 students in psychology. The test consisted in having the class memorize an extract from Keats, before studying the memory system, reproducing the words and ideas after three minutes and repeating the same process with a similar extract after studying the system. The result was negative.

*A little-known subterranean crayfish:* H. GARMAN, Kentucky Experiment Station. The underground streams of Kentucky are inhabited by an interesting crayfish with small eyes that lives and breeds at all times in these subterranean waters, only appearing in any numbers at the surface during freshets and retreating again from the light when it has an opportunity. It appears to be the eyed crayfish of early explorers of Kentucky caves, who assumed that it was merely a stray from among ordinary eyed crayfish of surface waters and regarded as identical with the widely distributed *Cambarus bartoni*. Somewhat recently it has been described as a variety of this surface-water

species by W. P. Hay, who named it *C. bartoni*, var. *tenebrosus*. It is a good species, however, of different general conformation from the species named, with which it does not intergrade. In fact, the surface-water species does not occur in some localities in which this small-eyed species is found. As a valid species it is believed to be entitled to the name *Cambarus tenebrosus*.

*A new phyllopod crustacean from Kentucky*: H. GARMAN, Kentucky Experiment Station. Temporary pools in Bluegrass Kentucky sometimes yield in early spring a species of *Eubbranchipus* differing from the common species (*E. vernalis*) of eastern states and also from those found in Illinois and other middle states. The name *Eubbranchipus neglectus* is assigned to it. During the thirty years it has been known to the author it has diminished in numbers, owing to changing conditions, and seems likely to become extinct; it has, in fact, disappeared in certain pools where thousands could have been secured twenty-five years ago.

*Studies in the etiology of infectious abortion in live stock*: E. S. GOOD, Kentucky Experiment Station. *Bacillus abortus* Bang is the organism causing the disease in the cow, in the United States, the same as in foreign countries. In 1911, a bacillus was isolated at the Kentucky Station from an aborted foal which we placed in Sub-group 2 of the Colon-typhoid group, which was found to be the cause of the disease in mares and jennets in Kentucky. Since that time, this germ has been found to be the causative agent of the disease in different states of this country, also in Canada, Holland and Sweden. Our results in immunizing mares against the disease are encouraging. Our investigations, so far, show that the *Bacillus abortus* Bang is the causative agent of the disease in sows.

*Mineral constituents of the paired seeds of cocklebur*: J. S. MCHARGUE, Kentucky Experiment Station. The impression is general that one of the two seeds of a cocklebur (*Xanthium*) will germinate the first spring after maturity and the second will remain dormant until the second spring thereafter. Previous investigators have attributed this apparent dormancy to inherent differences in the embryos and the seed coats. The writer finds that both seeds, if well developed, will germinate at approximately the same time, if they are removed from the burs and planted in moist sand. If allowed to remain in the burs, only one seed germinates until the bur disintegrates and decays, when the second seed will germinate. The mineral

constituents contained in the two seeds were found to be practically the same. The large seeds average about 65. mgs. and the small seeds about 45. mgs. The large seeds produce larger seedlings. This is accounted for by the fact that a large seed contains much more plant food than a small one.

*Hydrogen ion concentration and biological reactions*: D. J. HEALY, Kentucky Experiment Station. The fundamental importance of hydrogen ion concentration in the study of colloids, gels, enzymes and microbes was pointed out and illustrated by exhibits. An organic colloidal liquid at pH7.8 could not be past through a Pasteur-Chamberland F. bougie, but on adjusting the value to pH2, it passed easily. A 10 per cent. bacto-gelatin at pH5 formed a perfect gel, but with acidity equal to N/2 HCl or alkalinity of pH10, there was no gel. The oxidase of raw potato or apple was quite active at pH1.7, as shown by change in color of slices exposed to the air, but when fresh slices were soaked 15 minutes in water adjusted to pH1 and pH1.4, respectively, they dried in the air, without material change of color. A bacillus isolated from the afterbirth from a mare grew readily on agar slants of pH6.8 but failed to grow on similar slants at pH6.4.

*A study of inheritance of coat colors in Jersey cattle*: J. J. HOOPER, University of Kentucky. Studies of inheritance of Jersey cattle coat colors by the author show that white spots are recessive to dominant solid color, and a white tongue and tail-switch also are recessive. Colors of 1,145 calves were tabulated and compared with those of their 2,290 sires and dams. Some bulls studied seemed to be pure dominants, as their calves were all solid in color, although as many as a hundred were sired by each bull. It was found that 66 per cent. of Jersey cattle are solid in color and have black tongue and switch, while 12 per cent. are broken and have white tongue and switch; 3.6 per cent. are solid and have white tongue and black switch, etc.

*Animal versus vegetable proteins in the ration of laying hens*: J. HOLMES MARTIN, Kentucky Experiment Station. An experiment, now in its third year is described, in which 4 pens of 25 S. C. White Leghorn pullets, each, are being fed a basic ration of shipstuff and ground oats, supplemented by animal and vegetable protein carriers. The total egg production per pullet for the pen receiving butter-milk was 338 eggs; for that receiving tankage, 268; for that receiving tankage and cotton-seed

meal, 208; and for that receiving cotton-seed meal, 55. On reversing the rations in the cottonseed-tankage and cotton-seed pens, the egg production was reversed, showing that the difference in production depended on the ration. All pens received oyster shell, grit and charcoal.

*The seed corn situation in Kentucky:* W. D. VAL-LEAU, Kentucky Experiment Station. Investigations carried on at the Kentucky Experiment Station indicate that practically all seed corn in the corn belt is infected with *Fusarium moniliforme* Sheldon, and that this organism is capable of causing a root and stalk rot of corn. Infection on an ear appears not to be localized. Slightly infected seed may show no signs of infection, if grown only for a period of seven or eight days. Reddish discolorations developing in the seed coats during germination are an indication of infection. Seed studied was obtained from Kentucky, Georgia, Mississippi, Tennessee, Kansas, Arkansas, Missouri and Minnesota.

*Veterinary science:* W. W. DIMOCK, Kentucky Experiment Station. The author stressed the pressing necessity for research upon the nature and causes of diseases in live stock. He showed that the future of animal industry depended upon the control of animal diseases and that control can be secured only after the cause is known. He cited as an example the need for exact knowledge of the life histories of the internal parasites known as nematodes and showed how extensive are their ravages in horses. He believes that here, in their life history and in their effect on the host, is a field holding great promise to the investigator.

*Notes on the rapid analysis of magnesian limestone:* S. D. AVERITT, Kentucky Experiment Station. A differential method for the analysis of relatively pure magnesian limestone, without an actual determination of either Ca or Mg, which is quite rapid and sufficiently accurate for agricultural and most other purposes, is described. Determinations to be made are, A, neutralizing power of the limestone against  $N/2HCl$ , expressed as  $CaCO_3$ ; B, weight of insoluble matter +  $NH_4OH$  precipitate, from the same portion. Then

$$100 - B = \% CaCO_3 + MgCO_3,$$

and

$$5.35 (A - (100 - B)) = \% MgCO_3.$$

*Notes on light and light pressure:* C. C. KIP-LINGER, Mt. Union College, Alliance, Ohio. Some evidence is presented indicating that mass is not a universal property of light and certain photo-

chemical absorption experiments are described which show no measurable increase in weight of the reagents, following the action of light.

*Experiments with lime, acid phosphate and soil fungicides on land infested with root-rot disease of tobacco:* G. C. RUTT, Central Experimental Farm, Ottawa, Canada. Experiments are described looking to the possible control of the root-rot disease by applications of lime, acid phosphate, mixtures of lime and sulfur, dilute sulfuric acid, land plaster, copper sulfate, potassium polysulfid, gas lime, ferrous sulfate and formaldehyde. Acid phosphate seemed to be very beneficial in some instances, as did sulfuric acid, but the majority of the experiments gave negative results. The author concludes that the disease can not be controlled in this way.

*Plant growth:* G. D. BUCKNER, Kentucky Experiment Station. Comparative study was made of the translocation of the ash, phosphorus, calcium and magnesium from the cotyledons of germinating garden beans, *Phaseolus vulgaris*, when grown in distilled water culture and in garden soil. In the distilled water culture 55 per cent. of the original ash, 57 per cent. of the phosphorus, 25 per cent. of the calcium and 59 per cent. of the magnesium was translocated to the seedling, while, in the seedlings grown in garden soil, 91 per cent. of the ash, 92 per cent. of the phosphorus, 78 per cent. of the calcium and 83 per cent. of the magnesium was utilized by the seedling. The abnormal condition caused by the distilled water culture is shown and that less calcium than any of the other elements studied was removed from the cotyledons by the growing seedling is suggestive of its insoluble form in the cotyledons and its structural function.

ALFRED M. PETER,  
Secretary

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